



**SNC INDUSTRIAL  
TECHNOLOGIES INC.**

**SIMUNITION**

Division of SNC Industrial Technologies Inc.

***LEAD FREE, SHORT RANGE, FRANGIBLE AND TRACER  
SMALL ARMS TRAINING AMMUNITION:***

**A QUANTUM ADVANCE IN TECHNOLOGY**

***Presented by:***

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## ***TABLE OF CONTENTS***

|   |           |
|---|-----------|
| <b>1. ACKNOWLEDGEMENT .....</b>   | <b>1</b>  |
| <b>2. GENERAL CHARACTERISTICS.....</b>  | <b>2</b>  |
| <b>3. MAIN OBJECTIVES.....</b>  | <b>4</b>  |
| <b>4. STATUS ON THE 7.62MM SRTA PROGRAM .....</b>   | <b>5</b>  |
| <b>5. INTENDED MISSION AND FUNCTION .....</b>   | <b>6</b>  |
| <b>6. PHYSICAL CHARACTERISTICS.....</b>   | <b>7</b>  |
| <b>7. THE "PENCIL" TRACER TECHNOLOGY: A NEW<br/>CLASS OF LIGHT EMITTING PROJECTILE.....</b> | <b>8</b>  |
| <b>8. CHARACTERISTICS OF THE TRACER<br/>TECHNOLOGY .....</b>                                | <b>9</b>  |
| <b>9. BALLISTIC CHARACTERISTICS.....</b>  | <b>10</b> |
| <b>10. GUIDELINES FOR SAFETY AND USE.....</b>   | <b>14</b> |
| <b>11. CONCLUSION .....</b>   | <b>15</b> |



## 1. ACKNOWLEDGEMENT

Thanks to my colleagues  
for their contribution to this program, particularly:

◆ Ms Louise Guindon

Technical Director, Small Arms Ammunition,  
responsible for the supervision of the R&D work.

◆ Ms Danielle Tremblay

Responsible for adopting the pencil tracer technology  
to the frangible projectile compound.

◆ Mr. Patrick Lizotte

Responsible for optimizing the frangible compound  
for both ball and tracer projectiles.



## 2. GENERAL CHARACTERISTICS

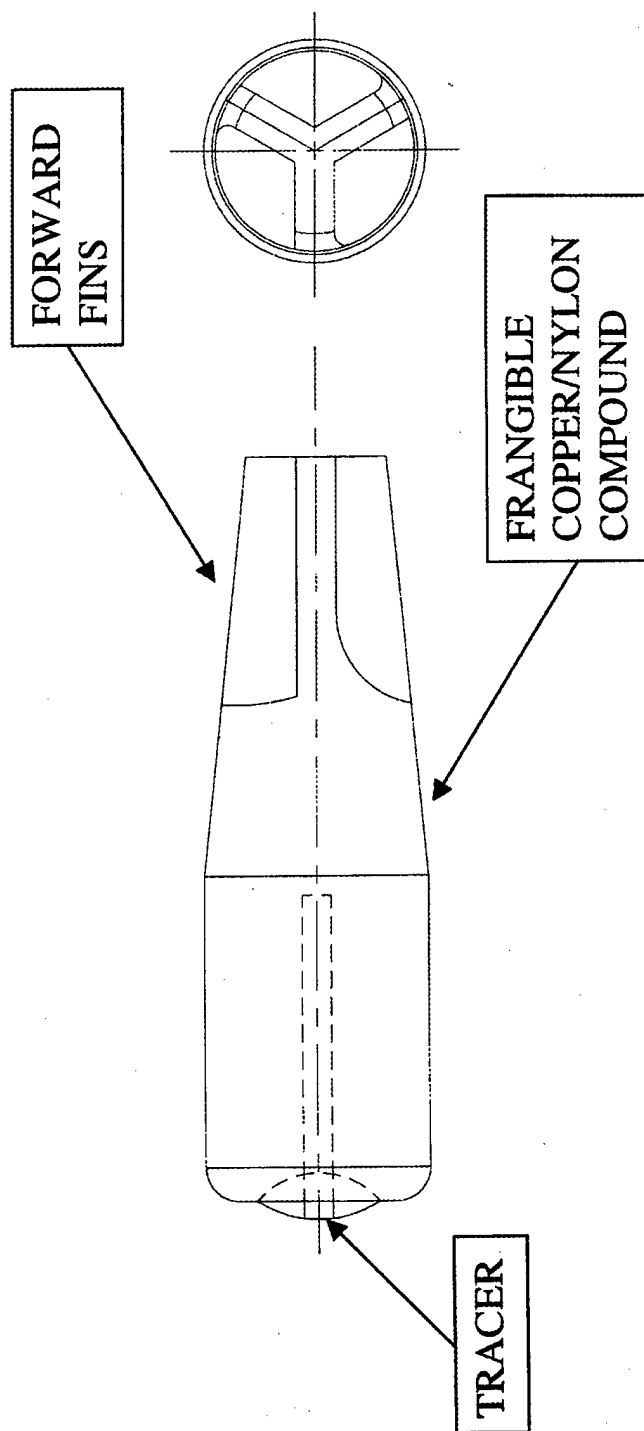
- The technology described in this paper has been developed for 7.62mm ammunition. However, it can well be applied to other small arms ammunition.
- Development works are underway to scale down the technology to 5.56mm caliber.
- The product, known under the trade name Short-Stop<sup>®</sup> ammunition, is based on a new projectile design with forward fins. A schematic representation of the product is shown in Figure 1.
- The fins introduce "reverse" spin to the rotation caused by the rifling, and thus, the resulting "reverse" spin causes the projectile to become unstable very quickly.



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**FIGURE 1 – Schematic representation of a 7.62mm SRTA-T projectile**



### 3. MAIN OBJECTIVES

The objectives of the R&D program conducted at SNC IT were as follows:

- To develop a short range training ammunition (SRTA), having a maximum range of about 400-500 meters compared to the maximum range of standard 7.62mm ball ammunition which is about 4,000 meters.
- To develop "green" and frangible ammunition.
- To adopt the pencil tracer technology to frangible compound.
- To match the accuracy of service rounds to 100 meters.



#### **4. STATUS ON THE 7.62MM SRTA PROGRAM**

- Generic qualification tests were conducted at ARDEC a few years ago following NATO 7.62mm D150 test procedures.
- An initial type qualification test was conducted by ARDEC and APG in early 1998.
- A full type qualification test should be conducted before the end of FY98.
- The product should be used for training purposes to support, for example, the MOUT program.
- Fielding of the product should take place in FY99 or FY00.



## 5. INTENDED MISSION AND FUNCTION

The 7.62mm SRTA ammunition solves many problems related to the safety template area within urban environments where there are few places and opportunities to train.

- Realistic training for various training scenarios can be achieved:
  - Reactive steel targets,
  - Shooting houses,
  - Outdoor ranges to reduce danger zones imposed by zoning laws and environmental restrictions,
  - Indoor ranges to reduce environmental maintenance costs,
  - Improvised training facilities with portable backstops,
  - Sniper initiated assault training at facilities using improvised or portable bullet traps.



## 6. PHYSICAL CHARACTERISTICS

- Cartridge case:
  - Brass (copper alloy 70/30)
- Primers:
  - Lead free primers available
  - Heavy metal free primers available
- Propellant:
  - Double base propellant
- Projectile:
  - Molded copper and nylon compound; the concentration in volume and weight being optimized to minimize projectile break-up.
  - Patented by SNC IT
- Tracer:
  - A pyrotechnic column formed of zirconium powder, potassium perchlorate and a suitable binder.
  - Patented by LSI / USA



## 7. THE "PENCIL" TRACER TECHNOLOGY: A NEW CLASS OF LIGHT EMITTING PROJECTILE

### ◆ Fabrication of the tracer cord:

- An elongated hole in a cord of soft metal is made,
- The hole is filled with a pyrotechnic composition,
- The diameter of the cord is reduced by extrusion to the desired size.

### ◆ Introduction of the tracer cord into the projectile body:

- The cord is cut to the required length (slugs),
- The slugs are inserted into the interior cavity of shaped projectiles,
- The slugs are compacted into the projectile body and they are held in place by mechanical or chemical means.



## 8. CHARACTERISTICS OF THE TRACER TECHNOLOGY

➤ Advantages of "pencil tracer" technology have been identified. They are:

- Full luminosity and viewing under *DAY* and *NIGHT* conditions,
- High reliability and simplicity of design,
- Large reduction in caloric output. The "cool light" transmits less than  $1/50^{\text{th}}$  of the heat to the outside atmosphere as compared to standard tracer ammunition,
- Enhanced safety,
- The heat loss to the walls controls the linear burning rate.



## 9. BALLISTIC CHARACTERISTICS

### a) Maximum range

- Measured and calculated values: less than 550 meters for a quadrant elevation of  $30^\circ$
- Methods of evaluation: radar tracking and calculations or recovery of projectiles on a suitable runway space.

### b) Precision:

- 7.5cm (3in) mean radius at 100 meters

### c) Trajectory:

- The 7.62mm SRTA/SRTA-T projectiles match the trajectory of ball round (M80) up to a range of 100 meters;  $\pm 1$  mils at 100 meters.



## 9. BALLISTIC CHARACTERISTICS ... cont'd

### d) Function and Casualty:

| Temperature  | Cycling rate: rounds / min | Weapon |
|--|----------------------------|--------|
| 70°F   | 532 – 560                  | M60    |
| 125°F  | 543 – 585                  | M60    |
| - 4°F  | 538 – 555                  | M60    |
| <b>The rounds function the weapons without any stoppage at all temperatures.</b> |                            |        |

### e) Noise Level

- Test conducted in accordance with TOP-1-2-608
- Noise level between M80 and the SRTA was found to be less than 1dB difference at each weapon position namely:
  - 5 meters rear of muzzle: 138 dB
  - 5 meters right of muzzle: 152 dB



## **9. BALLISTIC CHARACTERISTICS ... / cont'd**

### **f) EPVAT**

|                         | <b>SRTA<br/>Ammunition</b> | <b>Reference<br/>ammunition</b> |
|-------------------------|----------------------------|---------------------------------|
| <b>Chamber pressure</b> | <b>185 Mpa</b>             | <b>365 Mpa</b>                  |
| <b>Velocity at 24m</b>  | <b>800 m/s</b>             | <b>838 m/s</b>                  |

### **g) Waterproofness**

- Submerged rounds into water were subjected to a 50 Kpa vacuum for 30 seconds.
- Results show that the SRTA design with or without waterproofing sealant compound were 100% waterproof.



## 9. BALLISTIC CHARACTERISTICS ... / cont'd

### h) Ricochet

- No significant fragments were recovered after impacting steel targets placed 5 meters from the muzzle of M60 machine guns at 0° and 30° obliquity.

### i) Recoil

- Less than or equivalent to that obtained with service ammunition.



## 10. GUIDELINES FOR SAFETY AND USE

- No specialized procedures, techniques, tools as test equipment are required to train with Short-Stop<sup>®</sup> ammunition.
- This ammunition can be lethal.
- It is not recommended to stand 5 yards to the side of a target since metallic dust from impact of the projectile could cause an injury.
- Following sustained fire, the chamber should be emptied if there is a long delay until the next firing takes place.
- A minimum backstop plate of 1/4 inch armoured steel is recommended.



## 11. CONCLUSION

- The new Short-Stop<sup>®</sup> lead free, short range, frangible and tracer 7.62mm ammunition represents a quantum advance in the small arms ammunition technology.
- The same technology could be applied to other small arms weapon / ammunition systems.
- The initial and the final development phases are completed.
- The SRTA ball ammunition has already been industrialized.
- The product is safe to use and meets or exceeds environmental regulations.
- More detailed technical information can be obtained upon request.
- A firing demonstration will be done during the last session of this conference.